## Space Weather Forecast

Issued on Tuesday, 03 September 2024 at 00:13 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Moderate-class flares expected, slight chance of Strong flares. Chance of G1-G2 Geomagnetic storms, mainly Day 2 (04 Sep). Increasing chance of reaching S1/Minor Radiation Storm level.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Activity is Moderate with five Moderate-class flares in the past 24hrs, the peak of which occurred at 02/1343 UTC from the largest region in the southwest. There are eleven sunspot regions on the visible disc. The largest region is showing consolidation of the intermediate region with penumbra here starting to mature, and a magnetic complexity developing here. A region near south centre disc has numerous spots, and has now developed a magnetic complexity within the trailing spot. Finally, the newly arrived region in the far southeast appears to be a large and complex region, but due to foreshortening it is hard to distinguish the exact magnetic configuration at present. This region is showing significant looping in imagery, however. It is also being shortly followed by a further new region on the limb, which may be magnetically connected and contributing to the looping. All other regions are relatively simple and stable at present.

No further Earth directed Coronal Mass Ejections (CMEs) have been observed in the last 24 hours.

**Solar Wind / Geomagnetic Activity:** Solar wind parameters are at slightly elevated levels, perhaps due to the onset of a weak coronal hole fast wind. Wind speeds have ranged from 370-470 km/s. The Interplanetary Magnetic Field was weak, increasing to moderate after 02/1730 UTC. The north-south component, Bz, varied weakly before becoming mostly moderately northward directed. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

**Energetic Particles / Solar Radiation**: The count rate of energetic particles (high energy protons) has been rising in response to the larger flare on 01 Sep, but remains below the S1/Minor Radiation Storm level.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Moderate activity is expected with a slight chance of isolated Strong flares. The main flare risk is currently from any of the three larger sunspot regions in the southern hemisphere.

**Solar Wind /Geomagnetic Activity:** An eruption from 30/2330UTC may give a glancing blow on Day 1 (03 Sep). A large CME off the southeast limb on 01 Sep is expected to mostly pass well behind Earth's orbit, but some faint shock was evident in imagery, which means glancing impacts at Earth cannot be ruled out for this CME. The timing is low confidence, but perhaps Day 1 or more likely Day 2 (03-04 Sep). Solar winds are at slightly elevated levels, likely due to a weak coronal hole fast wind, with wind speeds perhaps briefly reaching elevated levels during Day 1 (03 Sep).

On the whole, mainly Quiet to Unsettled (Kp 1-3) activity is expected. There is a chance of G1-G2/Minor-Moderate Storm intervals (Kp 5-6), mainly on Day 2, should there be any peripheral impacts due to the CME from 01 Sep.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is currently above background levels, but below the S1/Minor Radiation Storm threshold. There is a slightly increasing chance of exceeding S1 in the coming days.

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 20 | 30 | 5 | 1 |
| Strong | G3 | No | 2 | 5 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 80 | 80 | 80 | 80 |
| Very Active | R3 to R5 X | No | 25 | 25 | 25 | 25 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 20 | 20 | 25 | 25 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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